



United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Veterinary
Services

Salmonella Shedding by Feedlot Cattle

National Animal Health Monitoring System

Salmonellae species have been associated with illness among many species of animals, including man. There has been concern that shedding of Salmonella bacteria may serve as a source for foodborne infection of people. However, data from the USDA's Cattle on Feed Evaluation indicate that Salmonella spp. isolates from cattle do not correspond well with serotypes most commonly associated with human illness.

The USDA:APHIS:VS conducted a study of health and management of cattle in feedlots as part of the National Animal Health Monitoring System's (NAHMS) Cattle on Feed Evaluation (COFE). One objective of the study was to determine the prevalence of Salmonellae in fecal samples collected in feedlot pens. A stratified random sample of feedlots from the 13 major cattle feeding states¹ was selected for the COFE. Four hundred ninety-eight (498) feedlots with at least 1,000 head capacity responded to the survey. Of those, 100 volunteer feedlots were enlisted for collection of feces to be evaluated for the presence of Salmonella spp. and Escherichia coli O157:H7.² In each feedlot, 25 fecal samples were collected from fresh feces on the floor of two pens of cattle. The two pens identified for sampling were those cattle that had been on feed the shortest and longest periods of time. The following details findings from these sampling activities.

Overall, Salmonella spp. were recovered from 5.5 percent of the samples collected (Table 1). Table 1 and Figure 1 show that twice as many samples collected from pens of cattle that had been on feed the longer period of time were

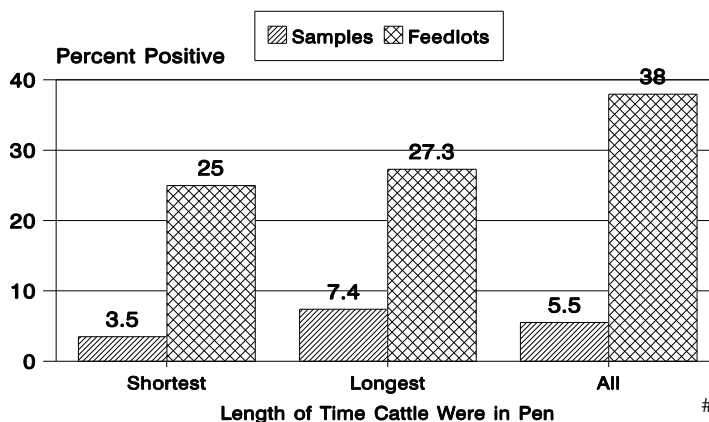
positive for Salmonella spp. This finding may indicate that more animals become infected with, or shed, the organism as the animals are housed together over time. Further analysis could determine if management factors in the late feeding period are more conducive to shedding of the organism. The positive samples came from 38 of the 100 feedlots with no apparent geographic clustering of positive feedlots. A single serotype of Salmonella spp. was identified in 16 feedlots. Multiple serotypes were isolated in 22 feedlots. Overall, 26 serotypes were identified.

Table 1

Time on Feed	Frequency of recovery of Salmonella spp. from samples collected in 100 feedlots by pen type.					
	Feedlots		Samples			
	Number Positive	Percent Positive	Number Collected	Number Positive	Percent Positive	
Shortest	25	25.0	2,482	88	3.5	↓
Longest	27	27.3	2,495	185	7.4	
All	38	38.0	4,977	273	5.5	

Figure 1

Frequency of Recovery of Salmonella spp. From Samples Collected from 100 Feedlots



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1 Arizona, California, Colorado, Idaho, Illinois, Iowa, Kansas, Minnesota, Nebraska, Oklahoma, South Dakota, Texas, and Washington. These states account for over 85 percent of the cattle on feed in the United States.

2 Results of sampling for E. coli O157:H7 are available in a separate report from the address shown at the end of this article.

Table 2 and Figure 2 show the five most common serotypes of *Salmonella* recovered from samples. The most common isolates associated with cattle illness for October 1990 through September 1991 were *S. typhimurium*, *S. dublin*, *S. typhimurium* var. *copenhagen*, *S. cerro*, and *S. newport*.¹ The lack of agreement between these results should not be surprising since the isolates from the COFE were not preferentially collected from animals that were ill. According to the Centers for Disease Control and Prevention (CDC) 1991 *Salmonella* Surveillance System annual summary, the five most common *Salmonella* spp. isolates associated with human illness were *S. typhimurium*, *S. enteritidis*, *S. heidelberg*, *S. hadar*, and *S. newport*.² Again, these isolates are not in agreement with the isolates recovered from the COFE.

In summary, cattle that have been on feed longer appear more likely to shed *Salmonella* spp. The sample prevalence of *Salmonellae* within feedlots appears to be highly variable and was very low or zero in about two-thirds of feedlots, such that it was not detectable based on 50 fecal samples in those feedlots. Shedding of *Salmonella* spp. serotypes commonly associated with human illness by cattle in this study occurred infrequently.

Future analyses of these data will focus on management factors associated with increased shedding of *Salmonella* organisms.

NAHMS collaborators on the COFE included the National Agricultural Statistics Service (USDA), State and Federal Veterinary Medical Officers, the National Veterinary Services Laboratories (USDA:APHIS:VS), and the National Animal Disease Center (USDA:ARS).

Other information from the COFE is available on feedlot quality assurance measures, environmental monitoring, injection

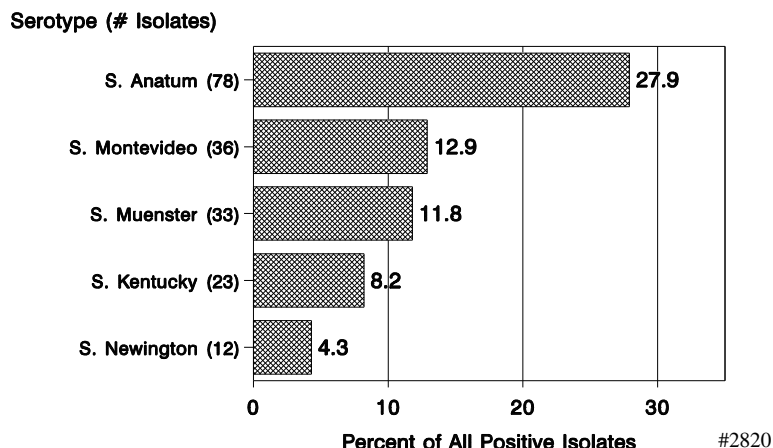
Table 2

Five most common serotypes of <i>Salmonella</i> spp. recovered from 100 feedlots.		
<i>Salmonella</i> Serotype	Number Isolates	Percent of All Positive Isolates
Anatum	78	27.9
Montevideo	36	12.9
Muenster	33	11.8
Kentucky	23	8.2
Newington	12	4.3



Figure 2

Five Most Common Serotypes of *Salmonella* spp. Recovered from 100 Feedlots



practices, and vaccination practices. For more information on these topics or the study in general contact:

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1 Isolates were from the on-going *Salmonella* serotyping service provided by the National Veterinary Services Laboratories. The isolates were from cattle with clinical disease.

2 These isolates were from all human *Salmonella* cases reported, regardless of suspected source of infection.